Department of Toxic Substances Control

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January 28, 2015

Lynn Suer
Remedial Project Manager
California Site Cleanup Branch 1 (SFD 7-1)
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75 Hawthorne Street
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Dear Ms. Suer:

Thank you for the opportunity to review the *Draft Engineering Evaluation/Cost Analysis (EE/CA)*, dated January 2015 for the AMCO Chemical Superfund Site located at 1414 3rds Street in Oakland, California. The EE/CA evaluates removal alternatives for the reduction of the highest concentration of volatile organic compounds (VOCs) found at the site. The activity is being conducted as a non-time critical removal action and is an interim remedy. Six removal alternatives were evaluated and In-Situ Thermal Heating (ISH) was identified as the recommended removal action alternative. DTSC staff from the Human and Ecological Risk Office (HERO), and Officer of Engineering and Special Project have reviewed the EE/CA and their comments are incorporated in the following comments. Comments from DTSC's Geologic Services Unit are enclosed with this letter.

1. There are a number of typographical errors, missing dates, and incomplete sentences throughout the document that affect the clarity of the text. We assume that these errors will be corrected in the final document.

2. Although the description of ISH or Alternative 4 on page ES-3 states that ISH can be implemented with minimal long term impacts to the existing structures and subsurface utility infrastructure, Section 6 does not include what any of those impacts may be and how they might be mitigated. In addition, the overall protectiveness of public health and the environment does not discuss the potential for impacts to the local community and workers due to fugitive vapor emissions.

3. We suggest that performance objectives (e.g., quantitative, semi-quantitative or qualitative) be included in the EE/CA so that success of the interim action can be evaluated.

4. The site's operational history is described in Section 2.1.2 and includes that in 1989 underground storage tanks (USTs) were likely removed, but the piping network was not. It is our recollection that when US EPA's Emergency Response Team excavated areas of the Site to determine whether USTs were present, concrete backfill was found instead. Is the location of the former USTs within the footprint of the treatment area and if so, would the backfill impact electrical conductivity and impact system performance? In addition, if the existing piping network stays in place, would it act as a preferential pathway for soil vapors?

5. Figure 6-5 indicates that there is a water line located to the south of the Site. Electrode locations are proposed to the south of the water line. Consider whether the water line could act as a preferential pathway for soil vapors and if measures can and need to be taken to prevent off-site migration of vapors.

6. It is unclear whether Section 2.3 (Source, Nature and Extent of Contamination) considered data collected in 2014 and reported in the RI Addendum (1500 samples from 125 locations). For example, Section 2.3.1.3. Soil describes data collected "during limited soil sampling (24 locations) conducted for the RI".

7. Table 4-1 Summary of ARARs contains numerous typographical errors and thus it is difficult to review. For example, 22 CCR Section 2520-2521, 22 CCR 66262.11 and 22 CCR Section 6626.34 do not exist. We suggest that the citations be checked and corrected. We also suggest adding the following California law and regulation: Health and Safety Code Section 25123.3, Remediation Waste Staging and 8 CCR 5192, Hazardous Waste Operation and Emergency Response.

DTSC's HERO reviewed the document and identified major flaws in the risk evaluation. HERO's comments are as follows.

1. The exposure pathways evaluated do <u>not</u> include the inhalation of indoor air contaminated with vapors intruding indoors from the sub-surface. Instead, vapor intrusion is discussed qualitatively in Section 3.7, and there is no attempt to quantitate the risks and hazards posed by this important exposure pathway. If there is no intent to quantitatively assess the vapor inhalation exposure pathway, the text in Section 3.7 should be revised to state that this is the overriding exposure pathway for the VOCs detected on site, and therefore, the calculation of risk and hazard is likely greatly underestimated in this risk evaluation.

2. The exposure point concentrations, toxicity criteria, and exposure parameters used to calculate the risks and hazards are not presented in this report, and no risk assessment spreadsheets are included. This information must be submitted as part of this report. Otherwise, it is not possible to determine if the exposure and risk calculations were performed properly.

3. The section of the report discussing soil contamination should include a table listing the risks/hazards from potential exposure to only the semi-volatile and non-volatile chemicals present in soil at the site and the risks/hazards from potential exposure to VOCs in soil. This is necessary in order to identify what fraction of the risks/hazards from potential exposure to soil can be attributed to non-volatile chemicals of concern that will not be affected by a removal action alternative that will address remediation of VOCs only.

4. The boundary of the source area evaluated in this risk evaluation should be provided in a figure along with the sample data locations and identification numbers that were used to perform the evaluation. The figure should include the boundary of the site as well, in order to be able to visualize what fraction of the site will be subjected to the proposed NTCRA.

5. The San Francisco Regional Water Quality Control Board (SFRWQCB) residential Environmental Screening Levels (ESLs) for groundwater and soil will be the removal action objectives (RAOs) for this removal action as listed in Table 5-1 of this EE/CA. (a) Footnotes should be added to the table, identifying the table designations in the SFRWQCB ESLs Report, and including the proper citation of the ESLs report. (b) The ESLs proposed for groundwater represent concentrations protective of the vapor intrusion pathway (Table E-1Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion, SFRWQCB, December 2013). The HERO previously reviewed the model used by the SFRWQCB to develop these ESLs and concluded that the ESLs have been acceptably calculated. Therefore, these groundwater ESLs are appropriate for use as RAOs for this EE/CA. (c) The soil ESLs represent the lowest of levels based on odors, ecotoxicity, human health and protection of groundwater (Table A-1, SFRWQCB, December 2013). Therefore, a footnote should be added that the soil ESLS are not necessarily based only on protection of human health. (d) In addition, the human health levels listed in Table A-1 of the SFRWQCB document for shallow soil is based only on direct soil exposure pathways and do not include consideration of the vapor intrusion pathway. Therefore, using these soil ESLs as RAOs may or may not show that risks to human receptors have been reduced to acceptable target levels after completion of the removal action. This should be so stated in the text.

6. At the joint meeting on September 29, 2014, the DTSC recommended that a public health evaluation of remedial alternatives (PHERA) be performed to evaluate the treatment alternatives. Since an alternative has been chosen in this EE/CA, the HERO recommends that a PHERA be performed to estimate the short-term and long-term risks and hazards that may be posed during the chosen remedial activity. This recommendation is made because of the elevated concentrations of VOCs in soil and groundwater on site, the proximity of residents and workers to the site and source area, and the potential that fugitive emissions from the treatment area could escape into the atmosphere and adversely affect ambient air quality.

The HERO concluded that the risk evaluation is unacceptable. First, it does not accurately represent the risks and hazards posed by the chemicals of concern present on the site, because the most important complete exposure pathway has not been considered. Second, the risk evaluation does not include the information needed to determine if the evaluation was performed properly, as discussed in HERO Comment 2 above.

Comments from DTSC's Officer of Engineering and Special Project are as follows.

1. The first sentence in paragraph 5 of the executive summary (page ES-2) states that concrete thickness is one to four feet. However, the text in Section 2.1.4.3 states that concrete thickness varies from six inches to 3.5 feet. See also first sentence in third paragraph in Section 3.2 Conceptual Site Exposure Model. The text should be modified to indicate the correct thickness.

2. Section 2.1 Site Description, Operation and History. The third sentence states that the site is bordered by an industrial property on the south and by a parking lot on the east. However, the attached figures appear to indicate that the site is bordered by Mandela Parkway on the east and by 3rd Street on the south. The text should be corrected.

3. Section 2.1.6 Sensitive Ecosytems. The second sentence states that the site is located 0.6 miles south of Oakland Inner Harbor. However, Figure 2-1 appears to indicate that the site is located north of the Inner Harbor. The text should be corrected.

4. Section 2.3 Source, Nature and Extent of Contamination. The first sentence states that there are 200 chemicals of concern (COCs). However, the text in Section 2.1.3 Regulatory History (Federal, State, Local) and Past Response Actions on page 2-8 under 2011: EPA Remedial Investigation states that 98 COCs were identified. The text should be correct to indicate the correct number of COCs or explain the numerical difference.

5. Section 5.2 Determination of Removal Scope. The second paragraph states that, "Additional performance evaluation sampling is recommended to better define the extent of the source zone contamination prior to implementing removal action". The report should be revised/expanded to include a timeline when the recommended sampling will be performed and all related costs should be included in the cost estimate.

6. Section 6.2.2 Effectiveness of Cleanup. The third sentence in the first paragraph states that the existing building cannot be removed. However, no reasons are included on why the building cannot be removed. The text should be revised to

include reasons why the building cannot be removed, or if the building can be removed, the effectiveness of this alternative should be re-evaluated.

7. Section 6.2.2 Effectiveness of Cleanup. The second sentence in the third paragraph states that over 600,000 gallons of heavily contaminated groundwater would be disposed of at an appropriate facility. It is not clear why a treatment process was not included to reduce the amount of contaminated groundwater requiring offsite disposal.

8. Section 6.2.3 Implementability of Removal Technology. The text in the fifth paragraph states that excavation is a very loud, high impact technology, especially when sheet piles must be driven. However, we note that noise levels can be reduced significantly via vibro-placement of sheet piles. It may be more accurate to describe the removal technology as loud rather than very loud.

9. Section 6.3.3 Implementability of Removal Technology. The text in the fifth paragraph states that costs would increase significantly if advance oxidation water treatment technology is required to remove 1,4-dioxane. However, it appears that such costs were not included in the cost estimate. These costs should be included for all alternatives where groundwater disposal to the sanitary sewer system may be required to provide a more complete evaluation.

10. Section 6.4.1 Description of Process/Technology. The text in the fifth paragraph states that the site will be sealed with cellular concrete to provide thermal insulation, prevent vapor extraction short circuiting and prevent fugitive VOC emissions. Cellular concrete usually has higher porosity than regular concrete and or other sealing materials. The text should be expanded to include a rationale for using cellular concrete rather than other materials with better sealing capabilities.

11. Section 6.4.1 Description of Process/Technology. The text in the eighth paragraph does not address the presence of dioxins in the extracted materials and how they would be addressed. The text should be expanded to discuss how dioxins would be handled, especially if it is not permissible to re-inject untreated groundwater or dispose it offsite.

12. Section 6.4.1 Description of Process/Technology. The text in the ninth paragraph states that bench scale testing would be required to confirm the feasibility of ERH and for electrode and extraction well spacing design. It is not clear that bench scale testing would be sufficiently representative of field, especially boundary, conditions. Pilot testing likely will be required, and should be included in the evaluation.

13. Figure 6-6 In-Situ Thermal Heating Process Diagram. It is likely that booster pumps will be required between the groundwater extraction/vapor recovery well and the

ERH condenser. The pumps should be included in the diagram and their costs added.

14. Figure 6-6 In-Situ Thermal Heating Process Flow Diagram. It is likely that a continuous emission monitor will be required at the discharge to atmosphere point after the vapor-phase GAC vessels. The monitor should be added to the diagram and its cost added.

If you have any questions regarding this letter, please contact me at (510) 540-3839 or lynn.nakashima@dtsc.ca.gov.

Sincerely,

Lynn Nakashima

Lynn Nakashima
Senior Environmental Scientist
Berkeley Cleanup Branch

Enclosure

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MEMORANDUM

TO: Lynn Nakashima, Project Manager
Senior Environmental Scientist
Cleanup Program, Berkeley Office
Brownfields and Environmental Restoration Program

FROM: Gerard Aarons, PG 7430, CHG 771 Eileen Hughes for
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Geological Services Branch
Brownfields and Environmental Restoration Program

CONCUR: Brian Lewis, PG 4287, CEG 1414, CHG 136
Senior Engineering Geologist, Unit Chief, Geological Services Unit
Geological Services Branch
Brownfields and Environmental Restoration Program

DATE: January 28, 2015

SUBJECT: **REVIEW OF THE DRAFT ENGINEERING EVALUATION/COST ANALYSIS [EE/CA], AMCO SUPERFUND SITE, OAKLAND, CALIFORNIA**

PCA 14118 SITE 200687-62 WR 20028066

DOCUMENT REVIEWED

Draft *Engineering Evaluation/Cost Analysis [EE/CA], AMCO Chemical Superfund Site, Oakland, California* (dated January 2015), prepared by Oneida Total Integrated Enterprises, on behalf of the United States Environmental Protection Agency, Region 9 (USEPA).

BACKGROUND

The draft EE/CA was prepared for the USEPA in order to evaluate removal alternatives for the reduction of volatile organic compounds (VOCs) at the Site, located at 1414 3rd Street, Oakland, California. The USEPA plans to conduct a Non-Time Critical Removal Action (NTCRA) to reduce the highest levels of VOCs at the Site. This EE/CA defines the

removal action objectives (RAOs) for the Site and then compares each alternative based on effectiveness, implementability, and cost. This draft EE/CA proposes *in-situ* thermal heating (ISH), in the form of electrical resistive heating (ERH), as the recommended removal action alternative for the NTCRA.

Implementing ISH at the Site would involve installing approximately 70 heating electrodes, 52 multi-phase extraction wells, and 24 monitoring points for measurement of temperature, pressure, and volatile organic compound (VOC) vapor concentrations. Three existing groundwater monitoring wells within the treatment area would be replaced using heat resistant materials, and eight new groundwater monitoring wells would be installed for performance monitoring. The heating electrodes and multi-phase extraction wells would be installed with approximately 20 foot spacing to achieve even heating as well as sufficient vapor recovery and hydraulic containment. Approximately 16 heating electrodes, eight multi-phase extraction wells, and three monitoring points would be installed through the foundation inside the warehouse and office buildings to monitor and treat contamination underneath the structures.

The NTCRA for the Site will be an interim remedy to address the portions of the Site with the highest concentrations of VOCs that pose a threat to human health or the environment. The USEPA will pursue a final removal action for the entire Site after the NTCRA is completed. The final removal action will address VOC and non-VOC contamination remaining on Site after completion of the NTCRA.

GENERAL COMMENTS AND RECOMMENDATIONS

1) The cost estimates provided in the EE/CA text, as well as Tables 6-1 through 6-5 need to include a cost contingency, based on the estimated level of detail provided in these designs, and an estimated percentage of design completion.

   Recommendation
   Please revise the text and tables to include a cost contingency, based on the estimated level of detail provided in these designs, and an estimated percentage of design completion.

2) *Alternative 4: In-Situ Thermal Heating* (ISH) is stated as the preferred NTCRA alternative. The ISH alternative acronym should also include the multi-phase extraction well system components (ISH/MPE).

   Recommendation
   Please revise the EE/CA to show that the ISH alternative includes the MPE system component in its acronym (e.g., ISH/MPE).

3) For *Alternative 4: In-Situ Thermal Heating*, the text is not clear as to the expected daily hours of operation.

Recommendation
Please revise the text to include the expected daily hours of operation.

4) *Alternative 4: In-Situ Thermal Heating* describes noise concerns during operation. Section 6.3.3 *Implementibility of Removal Technology* states: "MPE equipment would generate considerable noise during operations, however this can be mitigated through the use of sound insulating enclosures." The noise may also create conditions for reduced hours of planned operation during a 24-hour time period.

Recommendation
Please include costs associated with building sound insulating enclosures in the estimate. Since noise may create conditions for reduced hours of planned operation, describe alternative daily operation schedules; include the scheduling options in the cost estimate; and, evaluate potential impacts to the overall NTCRA completion schedule.

5) *Alternative 4: In-Situ Thermal Heating* should include a section that briefly describes the post-NTCRA performance monitoring and the operations and monitoring (O&M) activities which will be used to demonstrate that that RAOs have been met and that the system is operating as expected.

Recommendation
Revise the text to include a description of the post-NTCRA performance monitoring and O&M activities which will be used to demonstrate that the ROAs have been met and that the system is operating as expected.

SPECIFIC COMMENT AND RECOMMENDATIONS

1) *Section 6.4. Alternative 4: In Situ Thermal Heating. 6.4.1 Description of Process/Technology.*

   a. The overall lengths of the ISH electrodes being deployed were not provided.
   b. A bench-scale test is planned but no pilot-scale test has been included.
   c. The subsection on *Ability to Achieve Removal Action Objectives* states that ISH has the highest likelihood of achieving RAOs for soil and groundwater, as it addresses the vapor phase, the dissolved phase, and the adsorbed phase of the light non-aqueous phase liquid (LNAPL) and the VOCs across all depths of the entire treatment area.
   d. The subsection on *State Agency and Community Acceptance* states: "If groundwater containing 1,4-dioxane is not allowed to be re-injected on site, the extracted groundwater would either need to be treated using advanced oxidation or discharged to the sanitary sewer under a Special Discharge Permit from EBMUD."

Recommendations

a. Please revise this section to include the overall length(s) of the ISH electrodes being deployed. State whether or not the electrodes span the depths of the Site's impacted areas.
b. Please provide an explanation as to why no pilot-scale testing being proposed.
c. Please provide the depth of the entire treatment area.
d. Please clarify whether the cost of advanced oxidation or Special Discharge Permit from EBMUD is included in the cost estimate.

TABLE 6.3 *In-Situ* Heating Cost Summary

1) Regarding the subsection on *State Agency and Community Acceptance* :
   a. It's unknown if the cost of advanced oxidation water treatment or a permit to discharge extracted groundwater to the sanitary sewer in the estimate.
   b. It's unknown if the Site has the necessary infrastructure to run the ISH/MPE system.
   c. A considerable amount of power will be needed to operate the ISH/MPE system. It's unknown if the cost estimate includes the estimated cost of power to be consumed.
   d. It is expected that ISH equipment will generate considerable noise during operation; however, noise can be mitigated through the use of sound insulating enclosures.
   e. Implementing ISH would present a number of safety and security concerns (e.g., equipment and materials could be subject to theft and vandalism).

   Recommendations

   a. Include the cost of advanced oxidation water treatment or a permit to discharge extracted groundwater to the sanitary sewer in the estimate.
   b. Please explain current site conditions in terms of existing power supply infrastructure. Include the cost of Site upgrades necessary to bring power to the site, if needed.
   c. Please explain if the current estimate includes the cost of power consumption to operate the ISH/MPEW system.
   d. Please explain if the current estimate includes the cost of installing sound insulating enclosures.
   e. Please explain if the current estimate includes the cost of 24-hour security surveillance.

FIGURES

1) The EE/CA should be revised to include cross-section figures showing the depths at which the ISH electrodes and, SVE components (e.g., extraction and injection wells) will be deployed in relation to the treatment zone and to the extent of impacted media.

Recommendation
Include cross-section figures showing the depths at which the ISH electrodes, SVE, groundwater extraction, and injection wells will be deployed in relation to the treatment zone and to the extent of impacted media.

2) The EE/CA should include a schematic figure showing the Pacific Gas & Electric Company (PG&E) power grid with sources for 500 kilovolt (kV) or 240 kV power supply to the site.

Recommendation
Please include a schematic figure showing the PG&E power grid with sources for 500 kilovolt (kV) or 240 kV power supply to the site.

Peer reviewer: Eileen Hughes, PG 8170
Engineering Geologist, Geological Services Unit
Geological Services Branch
Brownfields and Environmental Restoration Program

If you have any questions or comments regarding this memorandum, please contact me at (510) 540-3987 or at Jerry.Aarons@dtsc.ca.gov or Brian Lewis at (510) 540-3950 or Brian.Lewis@dtsc.ca.gov.